WEB DESIGN FOR GOLDEN AGERS: DOES ANYBODY CARE?

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ABSTRACT

Older adults represent a major demographic group in both the U.S. and world populations. They usually use the Internet for communication, information research, and online purchases. This study investigates how selected web sites met the web design characteristics for older adults. We found that the sample web sites violated approximately five out of twenty characteristics. The top three most violated characteristics were all related to graphics.

Keywords: web accessibility, older adults, senior citizen, Internet, web design, navigation

INTRODUCTION

In 2000 the U.S. Census reported that the total U.S. population was approximately 270 million, and one fifth of the total U.S. population were people whose ages were at least 55 years old (15). The World Health Organization (WHO) reported that there were approximately 590 million people over the age of 60 in the world, and this number would increase to 1.2 billion in just 25 years (17). Clearly, older adults (i.e., at least 55 years old) represent a major demographic group in both the U.S. and world populations. Physical changes (such as vision impairment, cognitive and learning impairment, hearing impairment, and motor skills impairments) from aging are one significant factor that makes older adults experience inconveniences in accessing information on the Internet. Therefore, web sites should have certain characteristics in order to make them easily accessible for older adults (4).

The purpose of this study is to determine whether selected sites frequented by people aged 55 or older adhere to the web design recommendation by National Institute on Aging (NIA), Setting Priorities for Retirement Years (SPRY) Foundation, and Center for Medicare Education (CME).

LITERATURE REVIEW

The top five reasons that older adults use the Internet are (a) communicating with friends or relatives—excluding chat room and discussion (94 percent); (b) viewing news and current events (72 percent); (c) researching health information (70 percent); (d) making online purchases—excluding conducting transactions through Ebay (52 percent); and (e) researching various kinds of information—including information related to news and current events, health, genealogy, investment, and purchasing offline products or services (51 percent) (14).

Unlike other users in the age-based demographic group, older adults usually suffer a variety of physical changes from aging. Some of the more noticeable changes people experience as they age include those involving vision, cognitive and learning ability, hearing, and motor skills.
Vision

The recommended web site characteristics to support older adults who have color vision impairments are (a) use light background with dark text or vice versa (2) (b) avoid pattern wallpapers or background, (c) avoid fluorescent colors, red/green combinations, and blue/yellow combinations, (d) avoid clipart graphic icons unless they lead to better understanding, (e) provide alternative text for graphics, and (f) use graphics only when they will be useful and non-disturbing (5, 6, 9 & 12).

In order to support the possible vision impairments from cataract and presbyopia, the web site should have the following characteristics: (a) use non-fixed font size with a default display size between 12-14 points; (b) use sans serif type fonts; (c) use bold text instead of italic and/or underlined text; (d) avoid condensed space both between letters and between two lines; (e) when using buttons, icons, or graphic hyperlinks, include text hyperlink navigation; and (f) use large and easy-to-identify buttons, icons, or hyperlinked graphic/text (5, 6, 9, & 12).

Cognitive and Learning

The web site characteristics to support older users who experience cognitive and learning impairments are (a) keep page length within 2-3 screens; (b) avoid automatic page scrolling; (c) use simple, logical, and consistent page layout; (d) avoid frames; (e) use labels for both the name of the web site and the name of the page; (f) use multiple, clear, explicit, step-by-step navigation procedures; (g) avoid graphic icons unless they lead to better understanding; (h) provide easy-to-use and easy-to-locate help functions for both navigating the site and accessing information such as searching, site map and frequently asked questions; and (i) use left justification (3, 5, 6 & 12).

Hearing

The web site characteristics to support older users who experience hearing impairments are (a) provide alternative meaningful text for audio, and (b) use audio only when it will be useful and non-disturbing.

Motor Skills

The web site characteristics to support older users who experience motor skill impairments are (a) make sure that icons, buttons, or hyperlink graphic/text is large enough to facilitate selection of navigation, (b) use large and easy-to-identify buttons or icons, and (c) avoid graphic icons unless they lead to better understanding.

In order to ensure that older adults would be able to access the information on the Internet, organizations (especially NIA, SPRY, CME) and experts (7, 10 & 11) developed recommended characteristics for web designers and web developers to use in developing web sites. These characteristics provided the foundation for this study.
METHODS AND PROCEDURE

This study tries to answer the question “do the web sites that tend to be frequently viewed by older adults conform to the recommendations?” We tried to obtain the answer by evaluating web sites against the recommendations developed by NIA, SPRY Foundation, and Center for Medicare Education. We enhanced the international scope of the study by including Chinese language web sites to the study. Chinese web sites were selected because Chinese is the world’s most widely spoken language (8), and China has the world highest older adult population (1).

For this study, 60 English web sites and 30 Chinese web sites that fall into the top five reasons to use the Internet determined by SeniorNet survey of Internet use on older adults were selected. Due to the complicated nature of web sites, we could not exactly categorize web sites to match the previously mentioned top five reasons. Therefore we categorized web sites into the following six categories to further match quality: (a) email, online community and/or portal web sites, (b) news web sites, (c) health information web sites, (d) online shopping or auction web sites, (e) search engine web sites, and (f) information web sites excluding news and current events, health, genealogy, investment, and purchasing offline products or services.

Data Collection

The following procedure was used to select sites for this study. Keywords combining “senior” and/or “older adults” with words from the six categories of Internet use by older adults were entered into the top five search engines (13). Next, we evaluated approximately 1,000 web sites subjectively included in the population sample only those sites which would be hypothetically visited by parents or grandparents. The resulting sample included a total of 90 web sites: 60, English; 30, Chinese.

In this study, five examiners who were proficient at web design and web usability concepts conducted evaluations on the selected web sites based on the given criteria. The examiners were comprised of two native Chinese speakers, two native English speakers, and one non-native speaker in both English and Chinese. All of the examiners had a high command of the English language but different levels of proficiency in Chinese. If three of the examiners agreed that a particular web site failed to comply with a specific recommendation, the review result would indicate that a particular web site failed on that criterion.

Findings

A summary of the violations of the 20 recommended characteristics are provided below:

Characteristic 1: Use light background with dark text or dark background with light text. None of the reviewed web sites violated this characteristic.

Characteristic 2: Avoid pattern wallpapers or backgrounds. Approximately 8.9 percent of all samples (about 8.3 percent English and 10 percent Chinese) violated this characteristic by using pattern wallpaper or pattern background within the web sites.
Characteristic 3: Avoid fluorescent colors, red/green combinations, and blue/yellow combinations. Approximately 21.1 percent of all samples (about 18.3 percent English and 26.7 percent Chinese) violated this characteristic by including illegible or glaring colors.

Characteristic 4: Use non-fixed font size with a default display between 12-14 points. Approximately 48.9 percent of all samples (about 40 percent English and 66.7 percent Chinese) violated this characteristic by using fixed font size on some of the text within the web sites.

Characteristic 5: Use San Serif Type fonts. Approximately 14.4 percent of all samples (about 18.3 percent English and 6.7 percent Chinese) violated this characteristic by using non-San Serif type font on the text within the web sites.

Characteristic 6: Use bold text instead of italic and/or underlined text. Approximately 6.7 percent of all samples (about 6.7 percent English and 6.7 percent Chinese) violated this characteristic by using italic and/or underlined text to highlight information, excluding highlighted information which also served as hypertext link.

Characteristic 7: Use left justification. None of the reviewed web sites violated this characteristic.

Characteristic 8: Avoid condense space in both between letters and between two lines. None of the reviewed web sites violated with this characteristic.

Characteristic 9: Keep page length within 2-3 screens. Approximately 77.8 percent of all samples (about 76.7 percent English and 80 percent Chinese) violated this characteristic by having web pages in which the page length was longer than 3 screens.

Characteristic 10: Avoid automatic page scrolling. None of the reviewed web sites violated with this characteristic.

Characteristic 11: Use simple, logical, and consistent page layout. Approximately 38.9 percent of all samples (about 33.3 percent English and 50 percent Chinese) violated this characteristic by having more than three navigation styles and/or three navigational bars, conflicts of style among hyperlinks (for example some hypertext links were underlined while some were not), or conflicts among general layout of web pages.

Characteristic 12: Avoid frames. Approximately 8.9 percent of all samples (about 8.3 percent English and 10 percent Chinese) violated this characteristic by using frames.

Characteristic 13: Use labels for both the name of web site and the name of the page. None of the reviewed web sites violated with this characteristic.

Characteristic 14: Use multiple clear explicit step-by-step navigation procedure. Approximately 10 percent of all samples (about 8.3 percent English and 13.3 percent Chinese) violated this characteristic by having one or more than three navigation procedures and requiring users to take more than one minute to learn to navigate through the web site.
Characteristic 15: Providing text hyperlink when using buttons, icons, or graphic hyperlink. Approximately 86.7 percent of all samples (about 80 percent English and all Chinese) violated this characteristic by having more than three buttons, icons, or graphic hyperlink without alternative hypertext links to the same pages.

Characteristic 16: Use large and easy-to-identify buttons, icons, or hyperlink graphic/text to facilitate. Approximately 2.2 percent of all samples (about 3.3 percent English and no Chinese) violated this characteristic by having buttons, icons, or hyperlinked graphic/text which was too small to facilitate selection of navigation. In other words, text hyperlinks should be larger than 12 font size and the selection should remain the same for buttons, icons, or graphic hyperlinks when a mouse was lightly moved.

Characteristic 17: Avoid graphic icons unless they lead to better understanding. Approximately 47.8 percent of all samples (about 46.7 percent English and 50 percent Chinese) violated this characteristic by non explicit graphic icons. In other words, the graphic icons should help the user understand what would happen when the icons were clicked.

Characteristic 18: Provide easy-to-use and easy-to-locate help functions for both navigating the site and accessing information. Approximately 7.8 percent of all samples (about 10 percent English and 3.3 percent Chinese) violated this characteristic by lacking any easy-to-use and easy-to-locate help functions for both navigating the site and assessing information. Such help functions may be in the following forms: search, site map, index, and frequently ask questions. Preferred locations were either at the top or bottom of web page.

Characteristic 19: Provide alternative meaningful text for graphics and audio. Approximately 75.6 percent of all samples (about 65 percent English and 96.7 percent Chinese) violated this characteristic by having more than three graphics or audio without meaningful alternative text.

Characteristic 20: Use graphic and audio only when they will be useful and non-disturbing: Approximately 41.1 percent of all samples (about 36.7 percent English and 50 percent Chinese) violated this characteristic by having disturbing graphics or audio. In other word, graphics and audio should help users understand the content, and they should not disturb users while users browse through the main content.

On average, the sample web sites violated approximately five out of twenty characteristics. English samples violated about 4.6 characteristics while Chinese samples violated about 5.7 characteristics. It should be pointed out that a large amount of the samples did not comply with Characteristics 4, 9, 15, 17 and 19. The top three most violated characteristics (15, 17, and 19) were all related to graphics.
Table 2 Sample Violation Results by Percentage for Characteristic 1-10

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Web sites</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>0.0</td>
<td>8.3</td>
<td>18.3</td>
<td>40.0</td>
<td>18.3</td>
<td>6.7</td>
<td>0.0</td>
<td>0.0</td>
<td>76.7</td>
<td>0.0</td>
<td></td>
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<tr>
<td>Chinese</td>
<td>0.0</td>
<td>10.0</td>
<td>26.7</td>
<td>66.7</td>
<td>6.7</td>
<td>6.7</td>
<td>0.0</td>
<td>0.0</td>
<td>80.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>0.0</td>
<td>8.9</td>
<td>21.1</td>
<td>48.9</td>
<td>14.4</td>
<td>6.7</td>
<td>0.0</td>
<td>0.0</td>
<td>77.8</td>
<td>0.0</td>
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</table>

Table 3 Sample Violation Results by Percentage for Characteristic 11-20

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Web sites</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
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<tbody>
<tr>
<td>English</td>
<td>33.3</td>
<td>8.3</td>
<td>0.0</td>
<td>8.3</td>
<td>80.0</td>
<td>3.3</td>
<td>46.7</td>
<td>10.0</td>
<td>65.0</td>
<td>36.7</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>50.3</td>
<td>13.3</td>
<td>0.0</td>
<td>13.3</td>
<td>100</td>
<td>0.0</td>
<td>50.0</td>
<td>3.3</td>
<td>96.7</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>38.9</td>
<td>10.0</td>
<td>0.0</td>
<td>10.0</td>
<td>96.7</td>
<td>2.2</td>
<td>47.8</td>
<td>7.8</td>
<td>75.6</td>
<td>41.0</td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION

The results of this study suggest that many of the English and Chinese web sites frequented by older adults complied with some of the recommended characteristics developed by NIA, SPRY Foundation, and Center of Medicare Education. Before the review was conducted, we assumed that the web sites that frequented by older adults would explicitly not conform to the recommendation at all. This is due to our assumption that older adults are emerging Internet users; therefore, many web sites may not be able to facilitate older adults’ impairments. Although the results imply that the majority of the recommendations are followed, many English and Chinese web sites that frequented by older adults tended to violate the recommendations related to graphics.

It should be mentioned that the recommended characteristics are more related to web design for web accessibility than web usability. Web accessibility refers to access to the Web by everyone, regardless of disability (16) while web usability refers to the extent to which a web site can be used by users to effectively and efficiently achieve specific goals (10). For example, we did not examine the samples based on download time, web page errors, compatibility with different versions of web browsers, and so forth.

In addition, this study also introduced the international aspect of web design for older adults by including Chinese web sites in the web site reviews. This is due to the fact that Chinese is the most widely spoken language in the world (even though there are many Chinese dialects, the majority of the dialects use the same alphabetical system), and that China has the world highest older adult population.

From business perspective, there is no evidence to support that recommendation violation will affect profitability from web sites. However, it can be implied that web sites that violate many recommendations will discourage older adults from visiting such web sites, possibly affecting the ability of those sites to reach their full profitability potential.
We recommend that further study be conducted to include more perspectives of web usability; for instance, web sites should be evaluated against download time and a variety of web browsers (including web page reader browsers). Moreover, we recommend further study to improve the internationality of similar studies by including web sites from other well-used languages (French, German, Spanish, etc.).

REFERENCES

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